FINAL REPORT
JULY 2007

REPORT NO. 06-04F

EVALUATION TRANSPORTABILITY TESTING OF THE JOINT MODULAR INTERMODAL PLATFORM (JMIP) UNIT #4 TP-94-01, "TRANSPORTABILITY TESTING PROCEDURES"

Prepared for:

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REPORT NO. 06-04F **JULY 2007**

EVALUATION TRANSPORTABILITY TESTING OF THE JOINT MODULAR INTERMODAL PLATFORM (JMIP) UNIT #4 TP-94-01, REV. 2, JUNE 2004, "TRANSPORTABILITY TESTING PROCEDURES"

ABSTRACT

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked by the Logistics Research and Engineering Directorate (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct evaluation transportability testing on the Joint Modular Intermodal Platform (JMIP) Unit #4 manufactured by SEA BOX Inc, East Riverton, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures." The test payload consisted of metal pallets of 120MM Tank Ammunition.

The objective of the testing was to identify the adequacy of the JMIP for demonstration use and not final approval when transportability tested in accordance with TP-94-01, Revision 2, June 2004.

The following observations resulted from the testing of JMIP Unit #4:

1. Initially, forward and aft web restraints (crossing straps) were not used on each end of the payload. Following the reverse rail impact, the pallets and load moved excessively. The testing was stopped. Retesting included forward and aft web restraints.
2. The full-width end gates were used to restrain the payload and did not successfully complete testing.
3. Prior to the start of testing, the hard plastic end bumpers were replaced with a softer rubber end bumper.

4. The bottom plate on the main rail continued to deform and delaminate when the JMIP was loaded/unloaded onto/from the Palletized Load System (PLS) truck.

5. When loading the JMIP into the intermodal container, the point load caused by the JMIP side rail deformed the wall of the container.

6. The JMIP slid side-to-side throughout the Shipboard Transportation Simulator (STS) testing. The movement of the adjustment bolt on the cams occurred during the testing. Future designs of the cam locking devices should prevent the bolts from moving in and out.

7. The pins that hold the A-frame in the container transport position both failed and sheared.

8. The screws and springs on the tie-down rings were damaged which prevented the keepers from properly engaging.

9. One (1) tie-down ring was jammed in place. The spring and keeper mechanism had to be disassembled in order to remove the ring from the JMIP.

10. The lock rings on the roller shafts disengaged during testing and were found on the container floor.

11. The spring steel around the JMIC to JMIP locks were damaged and deformed. Additionally, one set of JMIC rings would not properly operate until the dirt was removed.

12. One (1) twistlock that held the full-width end gate in place on the A-frame end was damaged and would not function properly.

13. The bolts on the rear bumpers were loose at the end of testing.

14. The hex head rivets on the top of the deck and along the main rail at the A-frame end were loose.

15. The JMIP rails were bowing inward following extraction of the JMIP from the intermodal container onto the PLS truck.

16. The strap hooks cannot be placed in the rings in all orientations. For example, two (2) hooks cannot be oriented back-to-back in the tie-down rings.

17. Two (2) straps can only be used on each tie-down ring, and the rings are not permanently affixed to the platform.

The JMIP, as currently designed, is **not adequate** to be used to transport the 120MM Tank Ammunition with the full-width end gate.

The full-width end gates were replaced with intermediate gates for follow-on testing (06-04G, 06-04H, 06-04J). The intermediate gates were adequate to support the load. Therefore, the JMIP with the intermediate gates is adequate to be used for ammunition transport during demonstrations. The operational condition of the JMIP should be closely monitored during the demonstrations. Also, the Defense Ammunition Center, Transportation Engineering Division, shall be consulted for the ammunition loading and bracing instructions.

The pins that hold the A-frame in the container transport position and that failed during testing were reported to have been manufactured incorrectly. The pins were replaced for follow-on testing (06-04G, 06-04H, 06-04J) and successfully completed testing.

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REPORT NO. 06-04F

Evaluation Transportability Testing of the Joint Modular Intermodal Platform (JMIP) Unit #4 TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures"

TABLE OF CONTENTS

PART 1 – INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked by the Logistics Research and Engineering Directorate (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct evaluation transportability testing on the Joint Modular Intermodal Platform (JMIP) Unit #4 manufactured by SEA BOX, Inc, East Riverton, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures." The test payload consisted of metal pallets of 120MM Tank Ammunition.

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Joint Munitions Command (JMC), Rock Island, IL. Reference is made to the following:

1. AR 740-1, 15 June 2001, Storage and Supply Activity Operation.

2. OSC-R, 10-23, Mission and Major Functions of U.S. Army Defense Ammunition Center (DAC) 21 Nov 2000.

C. OBJECTIVE. The objective of the testing was to identify the adequacy of the JMIP for demonstration use and not final approval when transportability tested in accordance with TP-94-01, Revision 2, June 2004.

D. OBSERVATIONS.

1. Initially, forward and aft web restraints (crossing straps) were not used on each end of the payload. Following the reverse rail impact, the pallets and load moved excessively. The testing was stopped. Retesting included forward and aft web restraints.

2. The full-width end gates were used to restrain the payload and did not successfully complete testing.

3. Prior to the start of testing, the hard plastic end bumpers were replaced with a softer rubber end bumper.

4. The bottom plate on the main rail continued to deform and delaminate when the JMIP was loaded/unloaded onto/from the PLS truck.

5. When loading the JMIP into the intermodal container, the point load caused by the JMIP side rail deformed the wall of the container.

6. The JMIP slid side-to-side throughout the STS testing. The movement of the adjustment bolt on the cams occurred during the testing. Future designs of the cam locking devices should prevent the bolts from moving in and out.

7. The pins that hold the A-frame in the container transport position both failed and sheared.

8. The screws and springs on the tie-down rings were damaged which prevented the keepers from properly engaging.

9. One (1) tie-down ring was jammed in place. The spring and keeper mechanism had to be disassembled in order to remove the ring from the JMIP.

10. The lock rings on the roller shafts disengaged during testing and were found on the container floor.

11. The spring steel around the JMIC to JMIP locks were damaged and deformed. Additionally, one set of JMIC rings would not properly operate until the dirt was removed.

12. One (1) twistlock that held the full-width end gate in place on the A-frame end was damaged and would not function properly.

13. The bolts on the rear bumpers were loose at the end of testing.

14. The hex head rivets on the top of the deck and along the main rail at the A-frame end were loose.

15. The JMIP rails were bowing inward following extraction of the JMIP from the intermodal container onto the PLS truck.

16. The strap hooks cannot be placed in the rings in all orientations. For example, two (2) hooks cannot be oriented back-to-back in the tie-down rings.

17. Two (2) straps can only be used on each tie-down ring, and the rings are not permanently affixed to the platform.

The JMIP, as currently designed, is **not adequate** to be used to transport the 120MM Tank Ammunition with the full-width end gate.

The full-width end gates were replaced with intermediate gates for follow-on testing (06-04G, 06-04H, 06-04J). The intermediate gates were adequate to support the load. Therefore, the JMIP with the intermediate gates is adequate to be used for ammunition transport during demonstrations. The operational condition of the JMIP should be closely monitored during the demonstrations. Also, the Defense Ammunition Center, Transportation Engineering Division, shall be consulted for the ammunition loading and bracing instructions.

The pins that hold the A-frame in the container transport position and that failed during testing were reported to have been manufactured incorrectly. The pins were replaced for follow-on testing (06-04G, 06-04H, 06-04J) and successfully completed testing.

PART 2 - ATTENDEES

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PART 3 - TEST EQUIPMENT

1. Joint Modular Intermodal Platform Unit #4
   Manufactured by SEA BOX, Inc., East Riverton, NJ
   Model Number: J-MIP
   Serial Number: 00004
   Date of Manufacture: 26 January 2007
   Tare Weight: 4,240 lbs (without straps, rings, and end gates)

2. Joint Modular Intermodal Container
   Designed by Naval PHST Center - Earle, NJ
   Length: 51-3/4 inches
   Width: 43-3/4 inches
   Height: 43 inches

3. Palletized Load System Truck
   Model #: M1074
   Manufactured by Oshkosh Truck Corporation, Oshkosh, WI
   ID #: 10T2P1NH6N1044011
   NSN: 2320-01-304-2277
   Serial #: 44011
   Curb Weight: 55,000 lbs

4. Truck, Tractor, MTV, M1088 A1
   ID #: J0229
   NSN: 2320 01 447 3893
   VSN: NL1FSC
   MFG Serial #: T-018488EFJM
   Weight: 19,340 lbs

5. Semitrailer, flatbed, breakbulk/container transporter, 34 ton
   Model #: M872A1
   Manufactured by Heller Truck Body Corporation, Hillsdale, NJ
   ID #: 11-1505 NX05NZ
   NSN: 2330 01 109 8006
   Weight: 19,240 lbs

6. Railcar DODX 42353
   Manufactured by Thrall Car
   Length: 89 feet – 4 inches
   Empty Weight: 85,000 lbs.

7. Intermodal Container
   ID # USAU 020112-1
   Date of Manufacture: 05/95
   Manufactured by Med Union Containers, Izmir, Turkey
   Tare Weight: 4,920 lbs
   Maximum Gross Weight: 52,910 lbs

PART 4 - TEST PROCEDURES

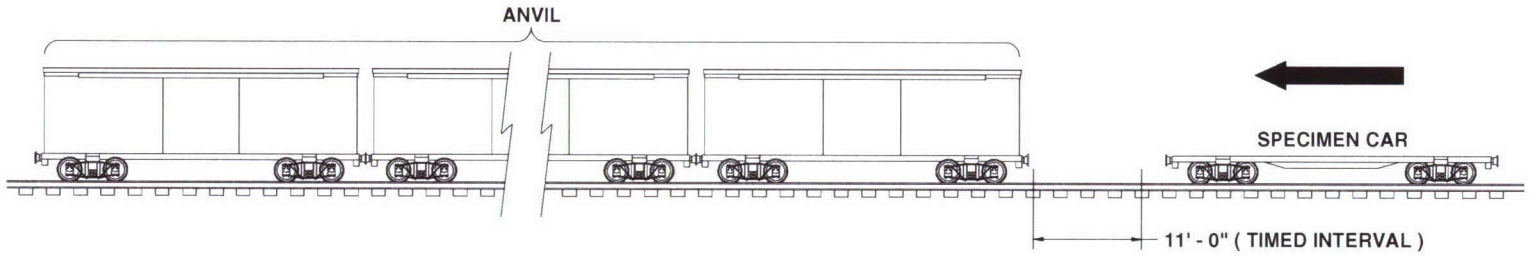
The test procedures outlined in this section were extracted from TP-94-01, "Transportability Testing Procedures," Revision 2, June 2004, for validating tactical vehicles and outloading procedures used for shipping munitions by tactical truck, railcar, and ocean-going vessel.

The rail impact will be conducted with the test load secured directly to the railcar. Inert (non-explosive) items were used to build the load. The test loads were prepared using the blocking and bracing procedures proposed for use with munitions (***see Part 6 – Drawings for procedures***). The weight and physical characteristics (weights, physical dimensions, center of gravity, etc.) of the test loads were similar to live (explosive) ammunition.

A. RAIL TEST. RAIL IMPACT TEST METHOD. The test load or vehicle will be secured to a flatcar. The equipment needed to perform the test will include the specimen (hammer) car, four empty railroad cars connected together to serve as the anvil, and a railroad locomotive. The anvil cars will be positioned on a level section of track with air and hand brakes set and with draft gears compressed. The locomotive unit will push the specimen car toward the anvil at a predetermined speed, then disconnect from the specimen car approximately 50 yards away from the anvil cars allowing the specimen car to roll freely along the track until it strikes the anvil. This will constitute an impact. Impacting will be accomplished at speeds of 4, 6, and 8.1 mph in one direction and at a speed of 8.1 mph in the reverse direction. The tolerance for the speeds is plus 0.5 mph, minus 0.5 mph for the 4 mph and 6 mph impacts, and plus 0.5 mph, minus 0 mph for the 8.1 mph impacts. The impact speeds will be determined by using an electronic counter to measure the time for the specimen car to traverse an 11-foot distance immediately prior to contact with the anvil cars (see Figure 1).

ASSOCIATION OF AMERICAN RAILROADS (AAR)

STANDARD TEST PLAN



4 BUFFER CARS (ANVIL)
WITH DRAFT GEAR
COMPRESSED AND AIR BRAKES IN A SET POSITION

ANVIL CAR TOTAL WT. 250,000 LBS (APPROX)

SPECIMEN CAR IS RELEASED BY SWITCH ENGINE TO
ATTAIN: IMPACT NO. 1 @ 4 MPH
IMPACT NO. 2 @ 6 MPH
IMPACT NO. 3 @ 8.1 MPH

THEN THE CAR IS REVERSED AND RELEASED BY SWITCH ENGINE TO ATTAIN:

IMPACT NO. 4 @ 8.1 MPH

Figure 1. Rail Impact Sketch

B. ON/OFF ROAD TEST.

1. HAZARD COURSE. The test load or vehicle will be transported over the 200-foot-long segment of concrete-paved road consisting of two series of railroad ties projecting 6 inches above the level of the road surface. The hazard course will be traversed two times (see Figure 2).

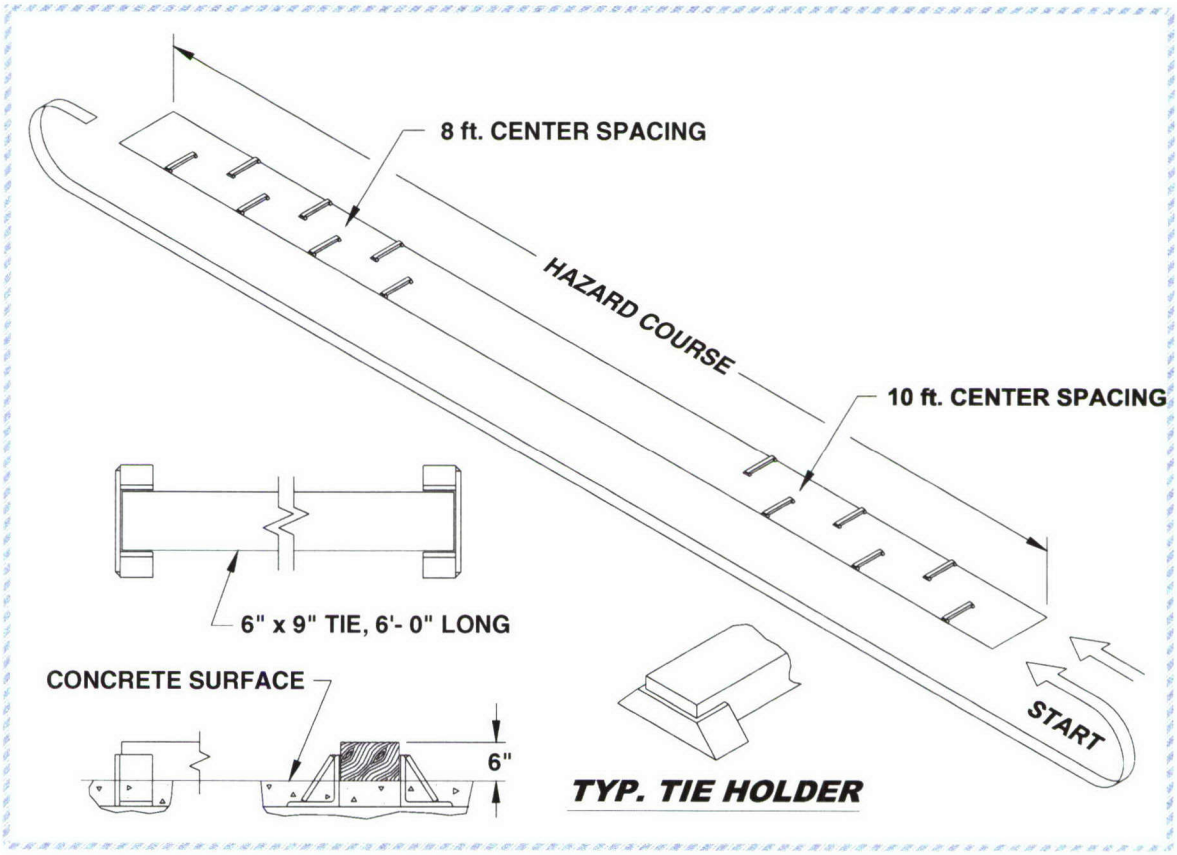


Figure 2. Hazard Course Sketch

a. The first series of 6 ties are spaced on 10-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 50 feet.

b. Following the first series of ties, a paved roadway of 75 feet separates the first and second series of railroad ties.

c. The second series of 7 ties are spaced on 8-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 48 feet.

d. The test load is driven across the hazard course at speeds that will produce the most violent vertical and side-to-side rolling reaction obtainable in traversing the hazard course (approximately 5 mph).

2. ROAD TRIP. The test load or vehicle will be transported for a distance of 30 miles over a combination of roads surfaced with gravel, concrete, and asphalt. The test route will include curves, corners, railroad crossings and stops and starts. The test load or vehicle will travel at the maximum speed for the particular road being traversed, except as limited by legal restrictions.

3. PANIC STOPS. During the road trip, the test load or vehicle will be subjected to three (3) full airbrake stops while traveling in the forward direction and one in the reverse direction while traveling down a 7 percent grade. The first three stops are at 5, 10, and 15 mph while the stop in the reverse direction is approximately 5 mph. This testing will not be required if the Rail Impact Test is performed.

4. WASHBOARD COURSE. The test load or vehicle will be driven over the washboard course at a speed that produces the most violent response in the vertical direction.

C. OCEAN-GOING VESSEL TEST. Shipboard Transportation Simulator (Test Method 5). The Shipboard Transportation Simulator (STS) is used for testing loads in 8-foot-wide by 20-foot-long intermodal freight containers. The specimen shall be positioned onto the STS and securely locked in place using the cam lock at each corner. Using the procedure detailed in the operating instructions, the STS shall begin oscillating at an angle of 30 degrees, plus or minus 2 degrees, either side of vertical center and a frequency of 2 cycles-per-

minute (30 seconds, plus or minus 2 seconds) for a duration of two (2) hours. This frequency shall be observed for apparent defects that could cause a safety hazard. The frequency of oscillation shall then be increased to 4 cycles-per-minute (15 seconds, plus or minus one second per cycle) and the apparatus operated for two (2) hours. If an inspection of the load does not indicate an impending failure, the frequency of oscillation shall be further increased to 5 cycles-per-minute (12 seconds, plus or minus one second per cycle), and the apparatus operated for four (4) hours. The operation does not necessarily have to be continuous; however, no changes or adjustments to the load or load restraints shall be permitted at any time during the test. After once being set in place, the test load (specimen) shall not be removed from the apparatus until the test has been completed or is terminated.

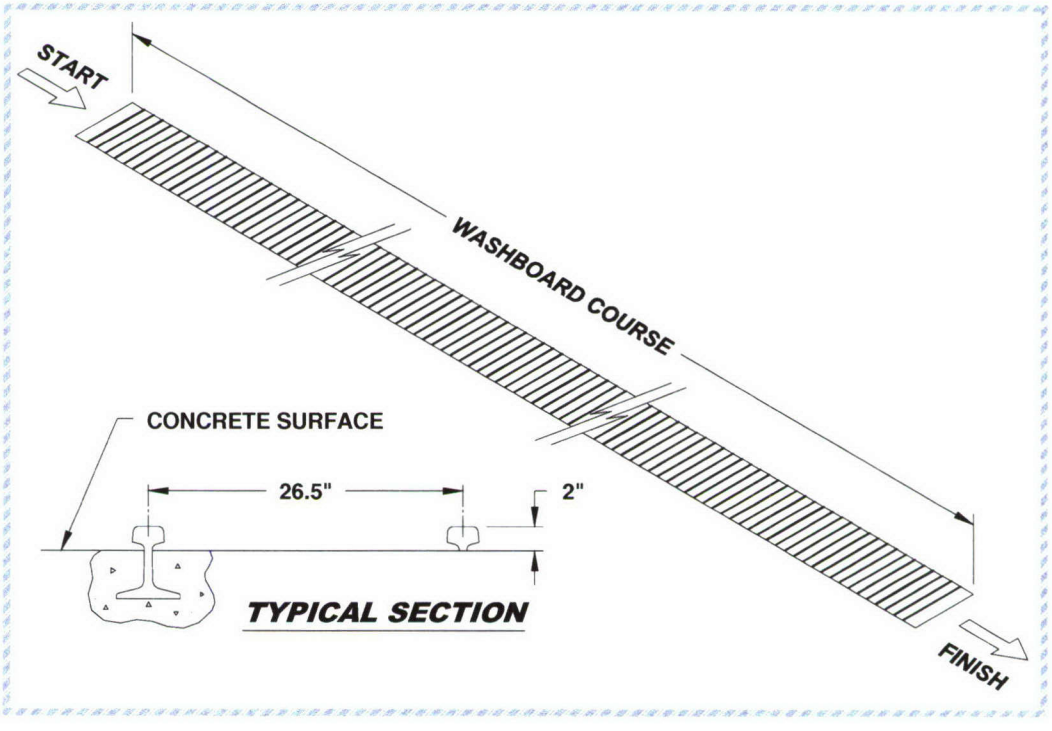


Figure 3. Washboard Course Sketch

PART 5 - TEST RESULTS

5.1

Test Specimen: SEA BOX Joint Modular Intermodal Platform Unit #4

Payload: 120MM Tank Ammunition with full-width end gates

Testing Date: 8 May 2007

Gross Weight: 24,880 lbs

A. RAIL TEST.

Photo 1. Rail Impact Testing of the JMIP (Prior to Testing)

Description	Weight
Flatcar Number: DODX 42353	85,000 lbs.
JMIP	24,880 lbs.
M1 Flatrack with MLRS Pods	28,265 lbs.
Total Specimen Wt.	138,145 lbs.
Buffer Car (four cars)	257,900 lbs.

Figure 4.

Remarks: Figure 4 lists the test components and weights of the items used during the Rail Impact Tests.

Impact Number	Avg. Velocity (mph)
1	4.5
2	6.0
3	8.1
4	8.7

Figure 5.

Remarks:

1. Figure 5 lists the average speeds of the specimen car immediately prior to impact with the anvil. Impact #4 is the reverse impact.
2. The JMIP was secured directly to the railcar for testing.
3. Following Impact #1, the payload compacted in the direction of impact 1.25 inches.
4. Following Impact #3, the payload racked and the top pallet moved in the direction of impact.
5. Following Impact #4, the dunnage at the non-bail-bar end of the JMIP moved 0.25 inches. The end gate was no longer vertical and had moved up 0.5 inches from the JMIP deck.
6. Following Impact #4, the payload had moved excessively and was no longer safely and properly positioned on the pallets. The end of the payload did not have cross straps. The testing was stopped and the JMIP was unloaded. See Photo 2.

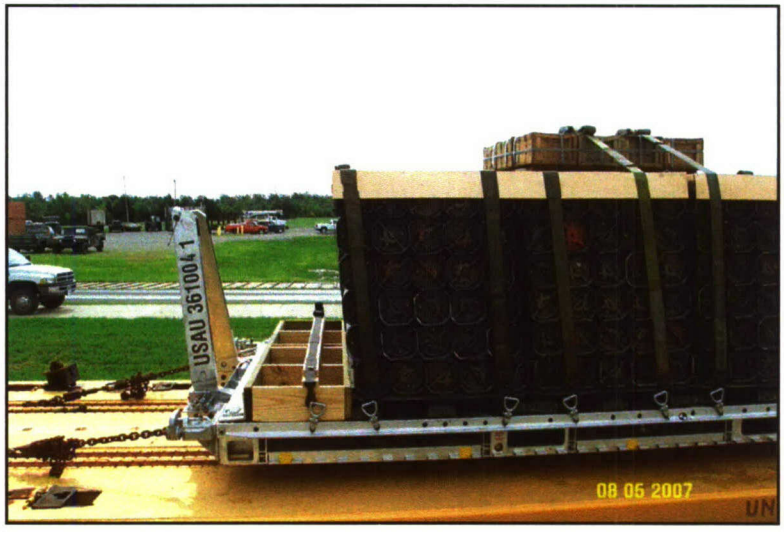


Photo 2. Rail Impact Testing of the JMIP (Following Impact #4)

B. OBSERVATIONS.

1. The strap hooks cannot be placed in the tie-down rings in all orientations. For example, two (2) hooks cannot be oriented back-to-back in the tie-down rings.
2. A maximum of two (2) straps can only be installed on each tie-down ring.
3. The tie-down rings are not permanently affixed to the platform.

5.2

Test Specimen: SEABOX Joint Modular Intermodal Platform Unit #4

Payload: 120MM Tank Ammunition

Testing Date: 10 -17 May 2007

Gross Weight: 25, 220 lbs (JMIP and payload)

Note:

1. Forward and aft web restraints were used at each end of the payload.
2. The rail transport pin holes on the JMIP aligned with the corresponding hole on the PLS truck. The rail impact testing was conducted with the JMIP on the PLS truck.

A. RAIL TEST.

Photo 3. Rail Impact Testing of the JMIP (Prior to Testing)

Description	Weight
Flatcar Number: DODX 42353	85,000 lbs.
PLS Truck with JMIP	75,380 lbs.
M1 Flatrack with MLRS Pods	28,265 lbs.
Total Specimen Wt.	188,645 lbs.
Buffer Car (four cars)	257,900 lbs.

Figure 6.

Remarks: Figure 6 lists the test components and weights of the items used during the Rail Impact Tests.

Impact Number	Avg. Velocity (mph)
1	5.2
2	6.1
3	7.9
4	9.3
5	8.3

Figure7.

Remarks:

1. Figure 7 lists the average speeds of the specimen car immediately prior to impact with the anvil. Impact #5 is the reverse impact.
2. Impact #3 was determined to be a "no test" due to the insufficient velocity at impact. The test was repeated.
3. The JMIP was secured to the PLS truck using the rail transport pins and the truck was chained to the flatcar.
4. Following Impact #5, the payload moved in the direction of impact 0.25 inches.
5. Inspection following the completion of testing did not reveal any damage to the JMIP rail transport pin holes.

B. ON/OFF ROAD TESTS.

1. HAZARD COURSE.

Photo 4. Hazard Course Testing of the JMIP

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	22 Seconds	6
2	22 Seconds	6

Figure 8.

Remarks:

1. Figure 8 lists the average speeds of the test load through the Hazard Course.
2. The JMIP was transported on the PLS truck.
3. Inspection did not reveal any damage to the JMIP.

2. ROAD TRIP:

Remarks:

1. The Road Trip was conducted between the Hazard Course Passes #2 and #3.

2. Inspection following the Road Trip revealed no damage or movement of the JMIP.

3. **PANIC STOPS:** Testing was not required since the load was rail impact tested.

4. **HAZARD COURSE.**

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	21 Seconds	7
4	20 Seconds	7

Figure 9.

Remarks:

1. Figure 9 lists the average speeds of the test load through the Hazard Course.
2. Inspection did not reveal any damage to the JMIP.

5. **WASHBOARD COURSE.**

Photo 5. Washboard Course Testing of the JMIP

Remarks: Inspection following the Washboard Course revealed no damage to the JMIP.

C. OBSERVATION. The bottom plate on the main rail continues to deform and delaminate when the JMIP is loaded/unloaded onto/from the PLS truck.

D. RAIL TEST.

Photo 6. Rail Impact Testing of the JMIP (Prior to Testing)

Description	Weight
Flatcar Number: DODX 42353	85,000 lbs.
JMIP	25,220 lbs.
M1 Flatrack with MLRS Pods	28,265 lbs.
Total Specimen Wt.	138,485 lbs.
Buffer Car (four cars)	257,900 lbs.

Figure 10.

Remarks: Figure 10 lists the test components and weights of the items used during the Rail Impact Tests.

Impact Number	Avg. Velocity (mph)
1	4.6
2	6.1
3	8.5
4	7.5
5	8.6

Figure11.

Remarks:

1. Figure 11 lists the average speeds of the specimen car immediately prior to impact with the anvil. Impact #5 is the reverse impact.
2. Impact #4 was determined to be a "no test" due to the insufficient velocity at impact. The test was repeated.
3. The JMIP was secured directly to the railcar.
4. Following Impact #1 the end cross straps, on the non-impact end, were loose.
5. Inspection following Impact #2 revealed a 0.375-inch gap between the payload and the dunnage on the non-impact end.
6. Following Impact #4 the end cross straps, on the non-impact end, were loose and there was a 0.375-inch gap between the payload and the dunnage on the non-impact end.

E. ON/OFF ROAD TESTS.

1. HAZARD COURSE.

Photo 7. Hazard Course Testing of the JMIP

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	24 Seconds	6
2	26 Seconds	6

Figure 12.

Remarks:

1. Figure 12 lists the average speeds of the test load through the Hazard Course.
2. The JMIP was secured directly to the M872 trailer.
3. Inspection did not reveal any damage to the JMIP.

2. ROAD TRIP.

Remarks:

1. The Road Trip was conducted between the Hazard Course Passes #2 and #3.
2. Inspection following Pass #3 revealed that one strap on the A-frame end had dropped down and wedged between the aluminum cans and the bottom adapter.
3. Inspection following the Road Trip revealed no damage or movement of the JMIP.

3. **PANIC STOPS.** Testing was not required since the load was rail impact tested.

4. **HAZARD COURSE.**

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	23 Seconds	7
4	23 Seconds	7

Figure 13.

Remarks:

1. Figure 13 lists the average speeds of the test load through the Hazard Course.
2. Inspection did not reveal any damage to the JMIP.

5. **WASHBOARD COURSE.**

Photo 8. Washboard Course Testing of the JMIP

Remarks: Inspection following the Washboard Course revealed no damage to the JMIP.

F. RAIL TEST.

Note:

1. Prior to the start of testing the hard plastic end bumpers were replaced with the softer rubber end bumpers.
2. When loading the JMIP into the intermodal container the point load caused by the JMIP side rail deformed the wall of the container.

Photo 9. Rail Impact Testing of the JMIP (Prior to Testing)

Description	Weight
Flatcar Number: DODX 42353	85,000 lbs.
JMIP and intermodal container	30,140 lbs.
M1 Flatrack with MLRS Pods	28,265 lbs.
Total Specimen Wt.	143,405 lbs.
Buffer Car (four cars)	257,900 lbs.

Figure 14.

Remark: Figure 14 lists the test components and weights of the items used during the Rail Impact Tests.

Impact Number	Avg. Velocity (mph)
1	3.1
2	4.3
3	5.9
4	7.5
5	7.6
6	8.8
7	8.5

Figure15.

Remarks:

1. Figure 15 lists the average speeds of the specimen car immediately prior to impact with the anvil. Impact #7 is the reverse impact.
2. Impacts #1, #4, #5 were determined to be a "no test" due to the insufficient velocity at impact. The tests were repeated.
3. The JMIP was secured inside the intermodal container.
4. Following Impact #6 the end cross straps, on the non-impact end, were loose and the rubber bumpers had compressed.

G. ON/OFF ROAD TESTS.

1. HAZARD COURSE.

Photo 10. Hazard Course Testing of the JMIP

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	25 Seconds	6
2	24 Seconds	6

Figure 16.

Remarks:

1. Figure 16 lists the average speeds of the test load through the Hazard Course.
2. The JMIP was transported in the intermodal container on the M872 trailer.
3. Inspection following Pass #1 revealed that the cross straps had tightened and one strap was wedged between the ammunition cans and the bottom adapter.
4. Inspection did not reveal any damage to the JMIP.

2. ROAD TRIP.

Remarks:

1. The Road Trip was conducted between the Road Hazard Course Passes #2 and #3.
2. Inspection following the Road Trip revealed no damage or movement of the JMIP.

3. PANIC STOPS. Testing was not required since the load was rail impact tested.

4. HAZARD COURSE.

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	24 Seconds	6
4	25 Seconds	6

Figure 17.

Remarks:

1. Figure 17 lists the average speeds of the test load through the Hazard Course.
2. Inspection did not reveal any damage to the JMIP.

5. WASHBOARD COURSE:

Photo 11. Washboard Course Testing of the JMIP

Remarks: Inspection following the Washboard Course revealed no damage to the JMIP.

6. SHIPBOARD TRANSPORTATION SIMULATION (STS).

Remark:

The JMIP slid side-to-side throughout the STS testing. Movement of the adjustment bolt on the cams occurred during the testing. Future designs of the cam locking devices should prevent the bolts from moving in and out.

H. OBSERVATIONS.

1. The bottom plate on the main rail continued to deform and delaminate when the JMIP was loaded/unloaded onto/from the PLS truck.

2. Movement of the adjustment bolt on the cams occurred during the testing. Future designs of the cam locking devices should prevent the bolts from moving in or out.

3. The pins that hold the A-frame in the container transport position both failed and sheared.

4. The screws and springs on many to the tie-down rings were damaged which prevented the keepers from properly engaging.

5. One tie-down ring was jammed in place. The spring and keeper mechanism had to be disassembled in order to remove the ring from the JMIP.

6. The lock rings on the roller shafts disengaged during testing and were found on the container floor.

7. The spring steel around the JMIC to JMIP locks was damaged and deformed. Additionally, one (1) set of JMIC rings would not properly operate until the dirt was removed.

8. One (1) twistlock that held the full-width end gate in place on the A-frame end was damaged and would not function properly.

9. The bolts on the rear bumpers were loose at the end of testing.

10. The hex head rivets on the top of the deck and along the main rail at the A-frame end were loose.

11. The JMIP rails were bowing in following extraction of the JMIP from the intermodal container onto the PLS truck.

Photo 12. Deformation of Main Rail

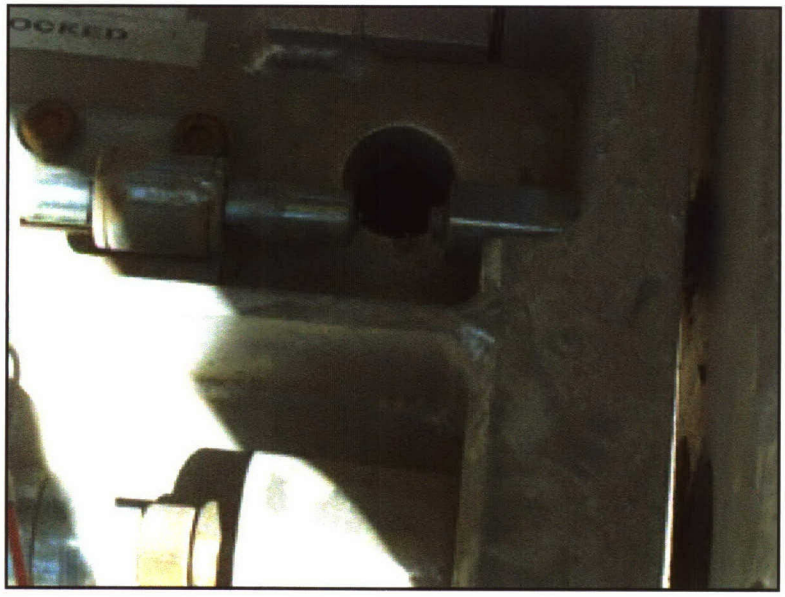


Photo 13. Damaged Container Transport Pin

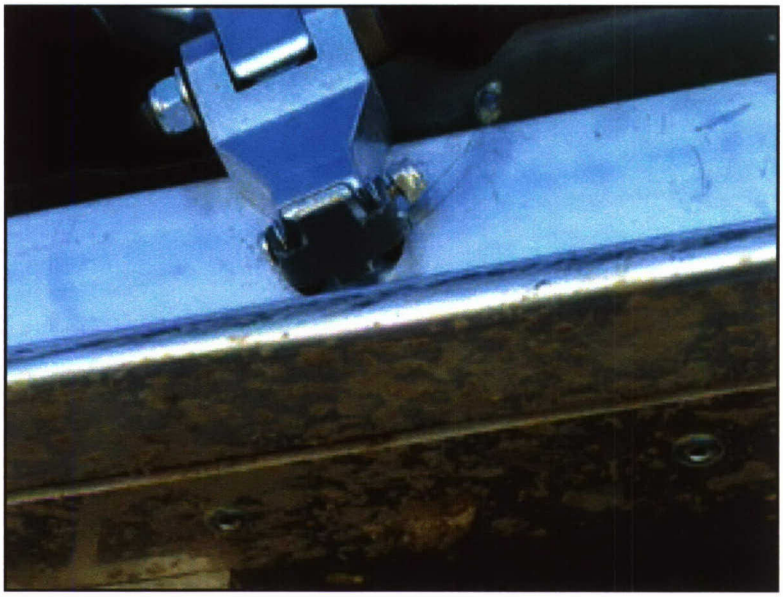


Photo 14. Keeper Not Properly Engaged

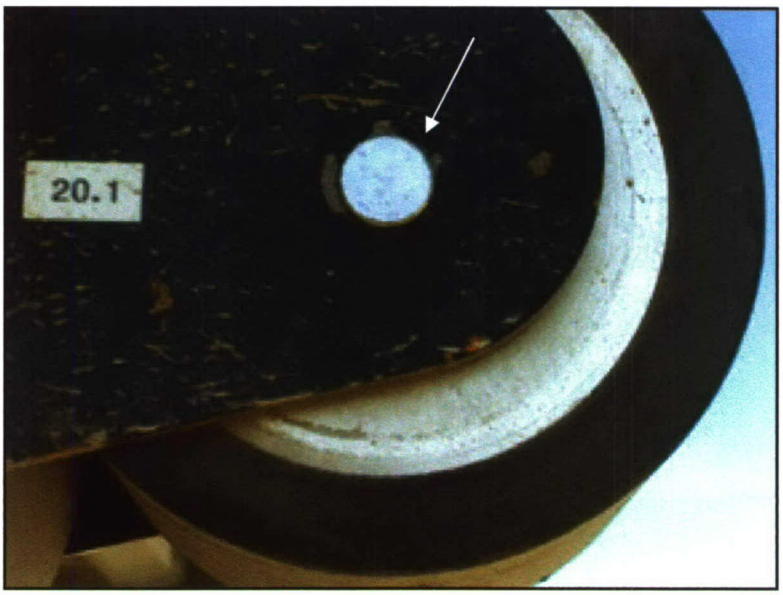


Photo 15. Missing Lock Ring

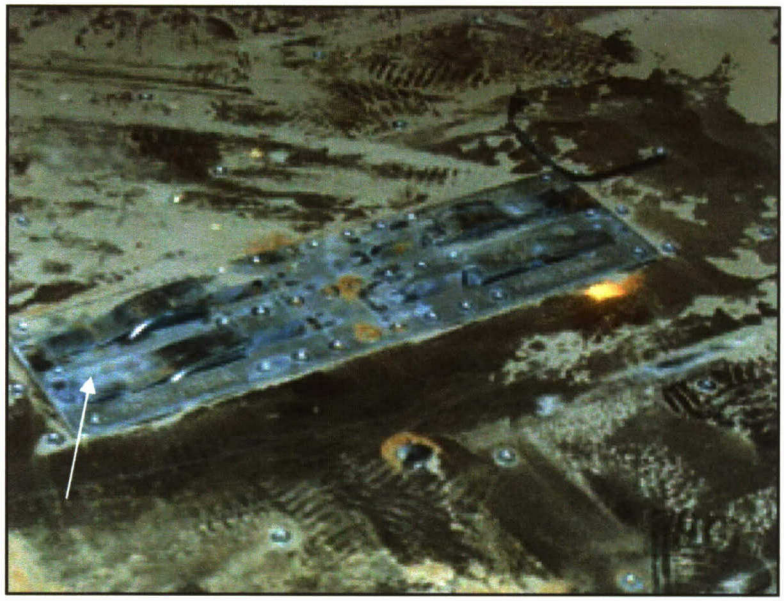


Photo 16. Damaged JMIC Lock Covers

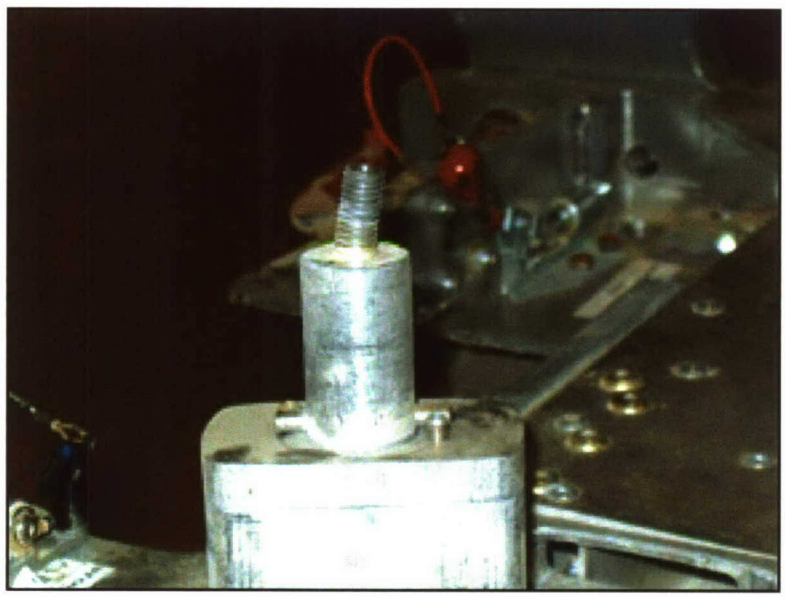


Photo 17. Damaged Twistlock

Photo 18. Loose Rivets

Photo 18. Bowing of JMIP Rails

I. CONCLUSIONS:

1. The JMIP, as currently designed, is **not adequate** to be used to transport the 120MM Tank Ammunition with the full-width end gate.

2. The pins that hold the A-frame in the container transport position and that failed during testing were reported to have been manufactured incorrectly. The pins were replaced for follow-on testing (06-04G, 06-04H, 06-04J) and successfully completed testing.

3. The full-width end gates were replaced with intermediate gates for follow-on testing (06-04G, 06-04H, 06-04J). The intermediate gates were adequate to support the load. Therefore, the JMIP with the intermediate gates is adequate to be used for ammunition transport during demonstrations. The operational condition of the JMIP should be closely monitored during the demonstrations. Also, the Defense Ammunition Center, Transportation Engineering Division, shall be consulted for the ammunition loading and bracing instructions.

PART 6 – DRAWINGS

The following drawing represents the load configuration that was subjected to the test criteria.

TEST SKETCH

LOADING AND BRACING OF CYLINDRICAL METAL CONTAINERS UNITIZED ON METAL PALLETS ON THE JOINT MODULAR INTERMODAL PLATFORM (JMIP)

THIS SIX PAGE DOCUMENT DEPICTS 120MM TANK AMMUNITION PACKED IN PA116 CONTAINERS ON 44" X 40" METAL PALLETS ON A SEABOX JMIP FOR TRANSPORTABILITY TESTING

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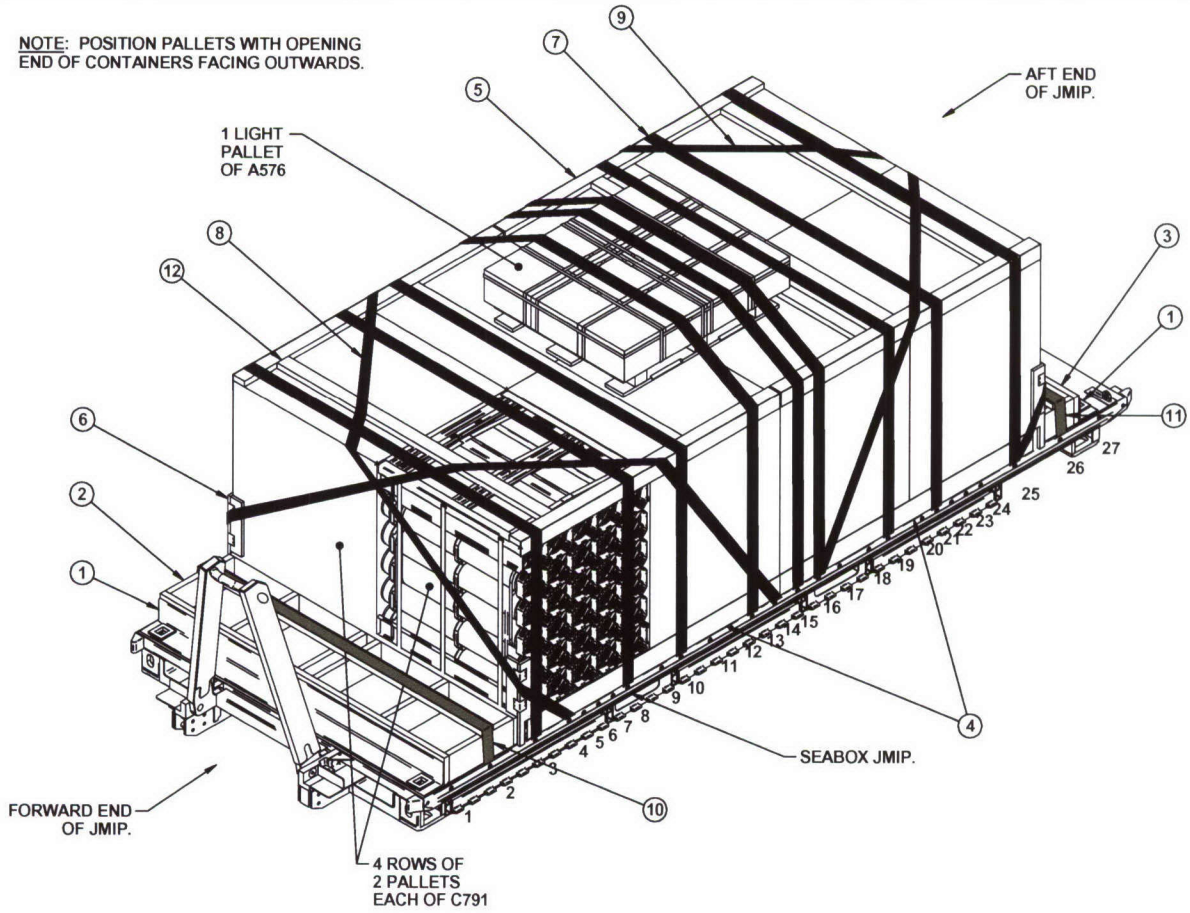


ISOMETRIC VIEW

(KEY NUMBERS CONTINUED)

⑨ AFT END RESTRAINT STRAP, 3-INCH WIDE WEB STRAP (2 REQD). INSTALL EACH STRAP TO EXTEND FROM THE TWENTY-FIFTH TIEDOWN PROVISION ON ONE SIDE OF THE JMIP, AROUND THE SIDE OF THE AFT C791 PALLET UNITS, OVER THE TOP OF THE AFT C791 PALLET UNITS, TO THE SIXTEENTH TIEDOWN PROVISION ON THE OPPOSITE SIDE OF THE JMIP. ALIGN SCUFF SLEEVES OVER ALL SHARP EDGES AND FIRMLY TENSION.

⑩ FORWARD RETAINER STRAP, 2-INCH WIDE WEB STRAP ASSEMBLY (1 REQD). INSTALL TO EXTEND FROM THE SECOND TIEDOWN PROVISION ON ONE SIDE OF THE JMIP, OVER THE TOP OF THE FORWARD BLOCKING ASSEMBLY STRAPPING BOARD, TO THE SECOND TIEDOWN PROVISION ON THE OPPOSITE SIDE OF THE JMIP. ALIGN SCUFF SLEEVES OVER ALL SHARP EDGES AND FIRMLY TENSION STRAP.

⑪ AFT RETAINER STRAP, 2-INCH WIDE WEB STRAP ASSEMBLY (1 REQD). INSTALL TO EXTEND FROM THE TWENTY-SIXTH TIEDOWN PROVISION ON ONE SIDE OF THE JMIP, OVER THE TOP OF THE AFT BLOCKING ASSEMBLY STRAPPING BOARD, TO THE TWENTY-SIXTH TIEDOWN PROVISION ON THE OPPOSITE SIDE OF THE JMIP. ALIGN SCUFF SLEEVES OVER ALL SHARP EDGES AND FIRMLY TENSION STRAP.

⑫ STRAPPING BOARD STRUT, 2" X 4" X 6'-10" (4 REQD). INSTALL ACROSS TOP OF C791 PALLET UNITS, LOCATED 10" AND 50" FROM THE END OF THE STRAPPING BOARD ASSEMBLIES. TOENAIL EACH END OF STRUT TO STRAPPING BOARD ASSEMBLIES WITH 2-10d NAILS.

KEY NUMBERS

① ALUMINUM END GATE (2 REQD). ALIGN HOLES IN END GATES WITH ISO TWIST LOCKS ON DECK OF THE JMIP. ENGAGE AND LOCK ISO TWIST LOCKS WITH THE END GATES. SEE DETAIL ON PAGE 3.

② FORWARD BLOCKING ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 3. CENTER AGAINST FORWARD JMIP END GATE.

③ AFT BLOCKING ASSEBMLY (1 REQD). SEE DETAIL ON PAGE 5. CENTER AGAINST AFT JMIP END GATE.

④ SIDE BLOCKING ASSEMBLY (4 REQD). SEE DETAIL ON PAGE 5. INSTALL TWO ON EACH SIDE OF THE JMIP ADJACENT TO THE C791 PALLET UNITS.

⑤ SIDE STRAPPING BOARD ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 5. INSTALL TWO ON EACH SIDE OF THE JMIP, ON THE EDGES OF THE C791 PALLET UNITS.

⑥ CORNER STRAPPING BOARD ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 6. INSTALL TWO EACH OF ASSEMBLY A AND ASSEMBLY B, ON THE CORNERS OF THE C791 PALLET UNITS, WITH BASE OF ASSEMBLY AGAINST THE DECK OF THE JMIP AND BEARING PIECE ALONG SIDE OF THE LOAD.

⑦ HOLD-DOWN STRAP, 3-INCH WIDE WEB STRAP (9 REQD). INSTALL EACH STRAP TO EXTEND FROM THE DESIGNATED TIEDOWN PROVISION ON ONE SIDE OF CROP, OVER THE TOP OF THE PALLET UNITS, TO THE CORRESPONDING TIEDOWN PROVISION ON THE OPPOSITE SIDE OF THE JMIP. ALIGN SCUFF SLEEVES OVER ALL SHARP EDGES AND FIRMLY TENSION STRAP.

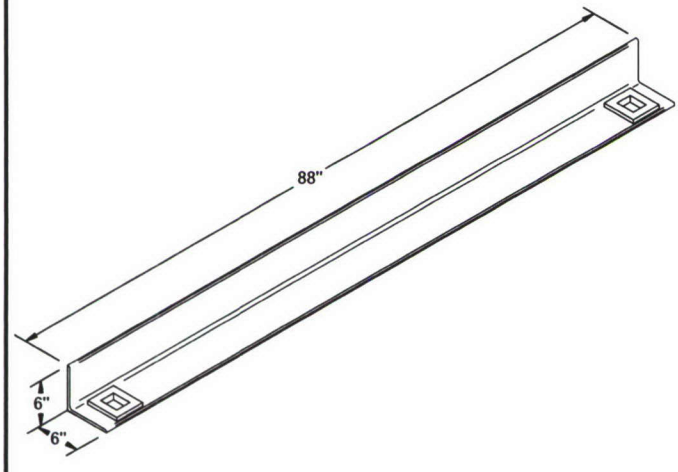
⑧ FORWARD RESTRAINT STRAP, 3-INCH WIDE WEB STRAP (2 REQD). INSTALL EACH STRAP TO EXTEND FROM THE FOURTH TIEDOWN PROVISION ON ONE SIDE OF THE JMIP, AROUND THE SIDE OF THE FORWARD C791 PALLET UNITS, OVER THE TOP OF THE FORWARD C791 PALLET UNITS, TO THE FOURTEENTH TIEDOWN PROVISION ON THE OPPOSITE SIDE OF THE JMIP. ALIGN SCUFF SLEEVES OVER ALL SHARP EDGES AND FIRMLY TENSION STRAP.

(CONTINUED AT LEFT)

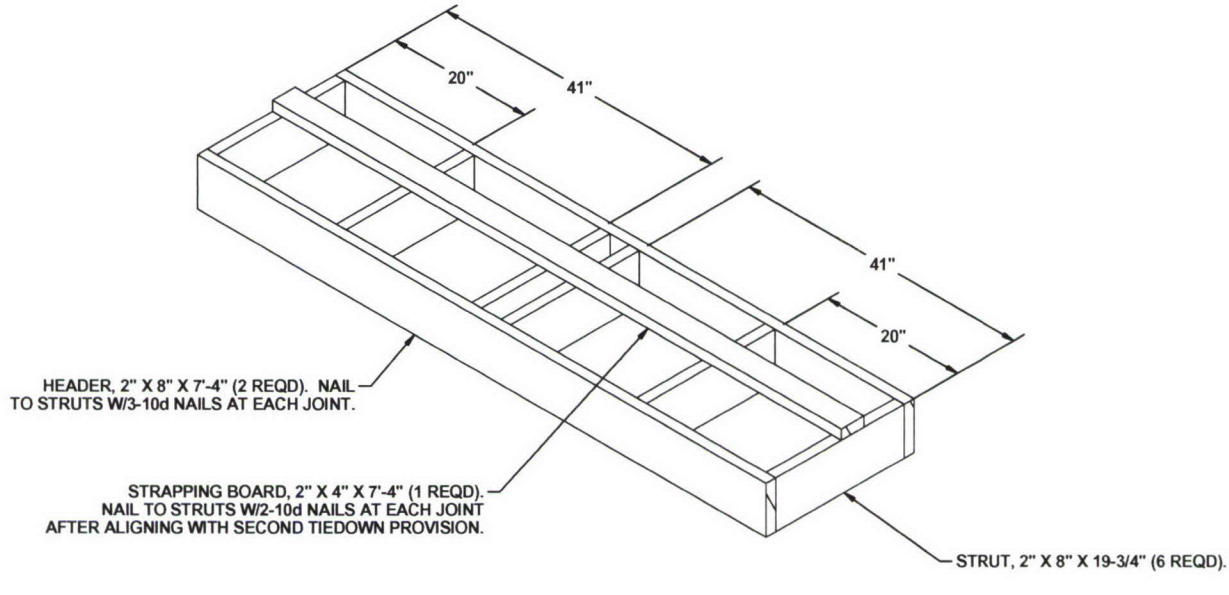
BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4" 2" X 8"	85 40	57 53
NAILS	NO. REQD	POUNDS
6d (2") 10d (3")	64 104	.38 1.58
2" WEB STRAP TIEDOWN ASSEMBLY - 2 REQD - - - - - 12 LBS		
1/8 PLYWOOD - - - - - - - 26.4 SQ FT - - - - - 9 LBS		
2" STEEL EDGE PROTECTOR - - - - 8 REQD - - - - - .50 LBS		

LOAD AS SHOWN ON PAGE 2

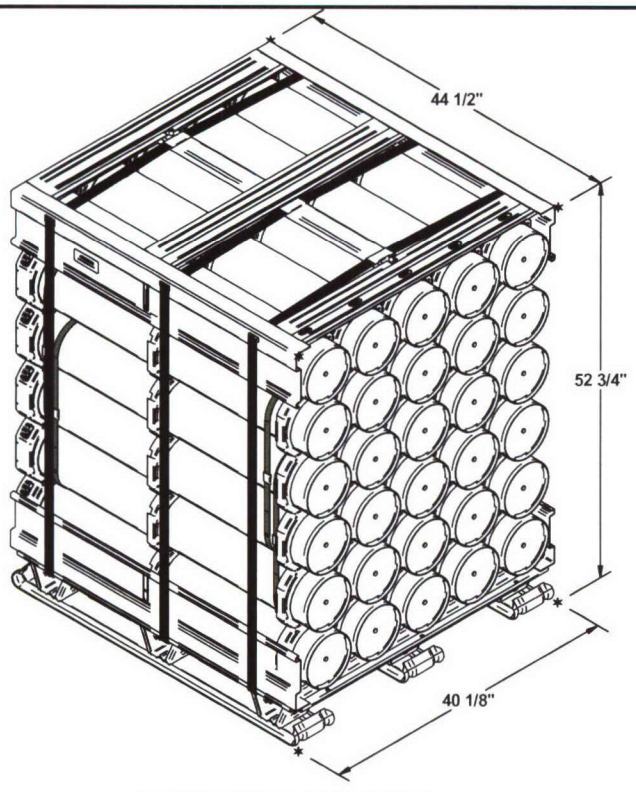
ITEM	QUANTITY	WEIGHT (APPROX)
C791 PALLET UNIT	- - 8 - - - - - -	19,840 LBS
A576 PALLET UNIT	- - 1 - - - - - -	991 LBS
DUNNAGE	- - - - - - - - - - - - - - - -	324 LBS
JMIP	- - - - - - - - - - - - - - - -	4,240 LBS
	TOTAL WEIGHT - - - - - -	25,395 LBS (APPROX)



ALUMINUM END GATES
(2 REQD)

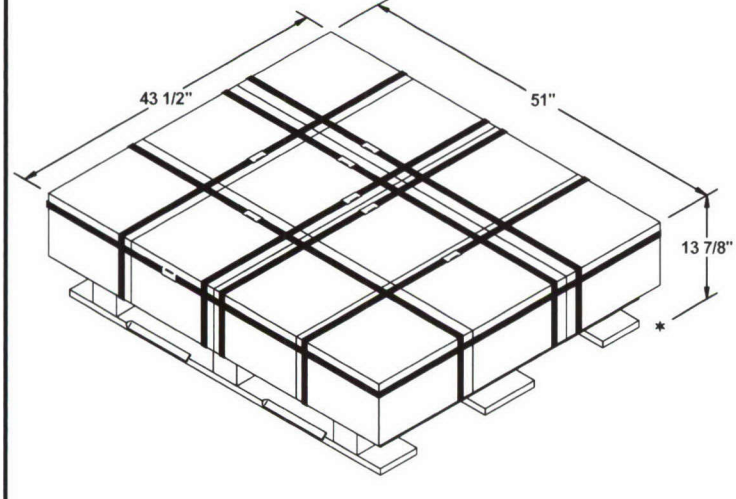


FORWARD BLOCKING ASSEMBLY
(1 REQD)



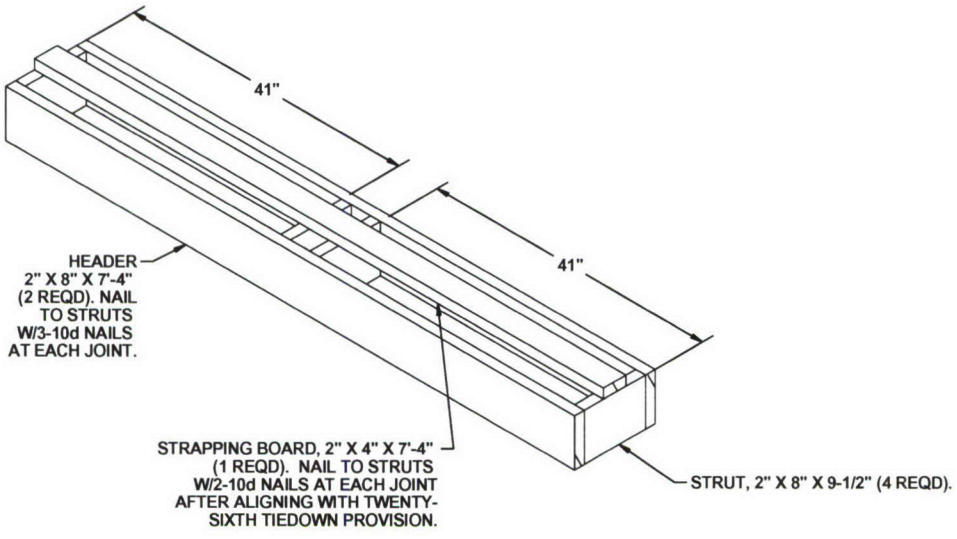
C791 PALLETS UNIT DETAIL
(8 REQD)

30 CNTRS OF 120MM CTG (1 PER CNTR) @ 76 LBS	2,280 LBS
DUNNAGE	100 LBS
PALLET	100 LBS
TOTAL WEIGHT	2,480 LBS (APPROX)
CUBE	54.5 CU FT (APPROX)

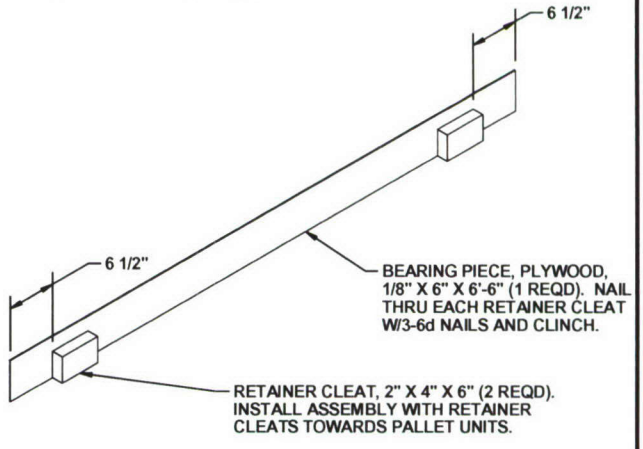


LIGHT A576 PALLET UNIT DETAIL
(1 REQD)

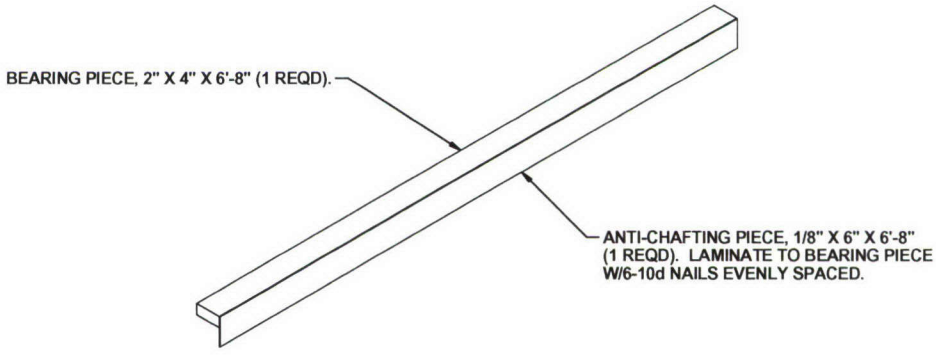
12 BOXES OF .50 CAL CTG (200 PER BOX) @ 75 LBS	900 LBS
DUNNAGE	11 LBS
CLOSED PANEL NAVY JMIC	80 LBS
TOTAL WEIGHT	991 LBS (APPROX)
CUBE	17.8 CU FT (APPROX)



AFT BLOCKING ASSEMBLY
(1 REQD)

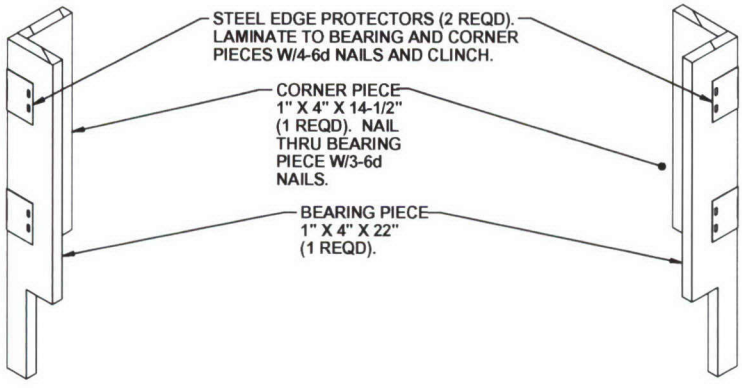


SIDE BLOCKING ASSEMBLY
(4 REQD)



SIDE STRAPPING BOARD ASSEMBLY
(4 REQD)

NOTE: PRODUCE EQUAL QUANTITES OF ASSEMBLY A AND ASSEMBLY B. EACH JMIP LOAD REQUIRES TWO OF EACH (4 TOTAL).



CORNER STRAPPING BOARD A

CORNER STRAPPING BOARD B